

A natural insecticide in the silk of some corn lines will deter earworms in the future if ARS scientists succeed in transferring genes that control the production of maysin.

he worm that turns the sweet corn ear into mush may be in for a turn of events, thanks to a plan as smooth as silk—corn silk, that is.

Agricultural Research Service scientists at Columbia, Missouri, and Tifton, Georgia, plan to manipulate a genetic pathway in corn silks to boost the production of maysin, a compound that gives the plant natural insect resistance.

"If it works, it will mean a sweet success for consumers and growers," says Michael McMullen, an ARS plant geneticist. "An added benefit of controlling the corn earworm would be in keeping it from moving on and damaging other crops like alfalfa, cotton, peanuts, and tomatoes."

Earworms cost U.S. growers more than \$100 million annually. Increasing maysin concentrations in corn silks could reduce insecticide used on sweet corn by up to 85 percent. Commercial growers sometimes have to apply insecticides 30 times a season to keep earworms out of sweet corn.

Adult earworms lay their eggs directly on the silk of growing corn,

where the larvae hatch about 3 days later. The newly hatched larvae eat their way through the silk, then feed on kernels, before dropping to the soil to mature.

After 12 days, new adults emerge from the soil and fly away in search of fresh food. It's then that they move into all sorts of other crops, including many home gardens.

The research plan, as designed by McMullen and plant geneticist Patrick Byrne, is to locate and characterize the genes that regulate the maysin-producing pathway.

McMullen and Byrne are working with plant geneticist Neil Widstrom, entomologist Billy Wiseman, and University of Georgia chemist Maurice Snook.

They have already identified a gene named PI that regulates more than half the amount of maysin in one corn population. If they can increase the expression of PI in corn silks and identify and manipulate other pathway genes, they then can increase the amount of maysin.

"Maysin, which occurs mainly in corn silk, binds up amino acids in the earworm's gut so the insect can't use them and literally starves to death," says Byrne.

Once the Missouri group has identified the key maysin genes, Widstrom will cross and select corn plants in Georgia that have the desired genetic makeup.

Maysin was first identified as a compound conferring resistance by the Tifton scientists in 1979. But only recently have gene mapping techniques become advanced enough that the likelihood of built-in resistance to earworms is just a few years away.

The Tifton researchers found maysin in a primitive race of corn from Mexico, highlighting the value of maintaining a large collection of exotic stocks in USDA's National Plant Germplasm System.—By Linda Cooke, ARS.

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